

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "106", as seen in Figs. 3, 4, 5A, 6, 10, 11B, and 14; "207", as seen in Fig. 1; "85" and "86", as seen in Fig. 5B; and "131", as seen in Fig. 11A and 12B. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "1211", as seen in par. 0081, lines 2, "rotational member 1211". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the

sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:
4. In par. 0055, line 1, the phrase, "intermediate transfer part 110", should instead read, "intermediate transfer part 100".
5. In par. 0057, lines 3-4, the phrase, "clearances 111 and 114", should instead read, "clearances I₁₁ and I₁₄".
6. In par. 0088, line 8, the phrase, "an amount of engagement 122", should instead read, "an amount of engagement I₂₂".

Appropriate correction is required.

Claim Objections

7. Claim 15 is objected to because of the following informalities: Claim 15 recites the limitation "the drive roller" in line 2. There is insufficient antecedent basis for this limitation in the claim. The Examiner believes that the Applicant intended to positively recite "a drive roller", as was claimed in claim 1. Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-3, 14-17 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Kurokawa et al. (US 5873016).

10. Regarding claim 1, Kurokawa et al. disclose a belt conveyance apparatus comprising: a drive roller [36] [Fig. 2]; a driven roller [59] [Fig. 1A] rotating in accordance with an operation of the drive roller [36]; a conveyance belt [35] [Fig. 2] engaged with the drive roller [36] for rotationally driving the conveyance belt [35] and the driven roller [59], the conveyance belt [35] being provided with a bead [65'] [Fig. 4B] formed on an inner side thereof; and driven roller support means [64] [Fig. 1A] for movably supporting the driven roller [59] in a thrust direction, wherein, in operation, ends of the drive roller [36] and the driven roller [59] interface with the bead [65'] of the conveyance belt [35] so as to restrict a deflection of the conveyance belt [35] in the thrust direction, and the driven roller [59] is movable in the thrust direction against a deflection of the conveyance belt [35].

11. Regarding claim 2, Kurokawa et al. disclose the belt conveyance apparatus as claimed in claim 1, wherein the bead [65'] is formed on each side of the conveyance belt [35] in a direction of width thereof, and a clearance between a first end of the driven roller [59] and the driven roller support means [64] on a side of the first end of the driven

roller [59] is greater than a sum of a first clearance between a second end of the driven roller [59] and the bead [65'] located on a side of the second end of the driven roller [59], a second clearance between a first end of the drive roller [36] and the bead [65'] on a side of the first end of the drive roller [36], and a third clearance between a second end of the drive roller [36] and the bead [65'] [In the invention of Kurokawa et al., there is negligible clearance between the bead on a particular end and the respective end of the rollers, thus the sum of all three measures is also negligible and less than the clearance between the first end of the driven roller and the driven roller support means].

12. Regarding claim 3, Kurokawa et al. disclose the belt conveyance apparatus as claimed in claim 1, wherein the bead [65'] is provided on an inner side of the conveyance belt [35], and a groove is formed on a circumferential surface of the drive roller so that the bead is brought into engagement with the groove [See Fig. 1A].

13. Regarding claim 14, Kurokawa et al. disclose the belt conveyance apparatus as claimed in claim 1, further comprising pressing means [12] for pressing the conveyance belt to the drive roller [36], wherein the pressing means [12] is located at a position opposite to the drive roller [36] with the conveyance belt [35] interposed therebetween [col. 2, lines 49-53].

14. Regarding claim 15, Kurokawa et al. disclose an image forming apparatus comprising: image forming means for forming an image; and a belt conveyance apparatus including: a drive roller [36] [Fig. 2]; a driven roller [59] [Fig. 1A] rotating in accordance with an operation of the drive roller [36]; a conveyance belt [35] [Fig. 2] engaged with the drive roller [36] for rotationally driving the conveyance belt [35] and

the driven roller [59], the conveyance belt [35] being provided with a bead [65] [Fig. 4B] formed on an inner side thereof; and driven roller support means [64] [Fig. 1A] for movably supporting the driven roller [59] in a thrust direction, wherein, in operation, ends of the drive roller [36] and the driven roller [59] interface with the bead [65] of the conveyance belt [35] so as to restrict a deflection of the conveyance belt [35] in the thrust direction, and the driven roller [59] is movable in the thrust direction against a deflection of the conveyance belt [35].

15. Regarding claim 16, Kurokawa et al. disclose the image forming apparatus of claim 15, wherein the bead [65] is formed on each side of the conveyance belt [35] in a direction of width thereof, and a clearance between a first end of the driven roller [59] and the driven roller support means [64] on a side of the first end of the driven roller [59] is greater than a sum of a first clearance between a second end of the driven roller [59] and the bead [65] located on a side of the second end of the driven roller [59], a second clearance between a first end of the drive roller [36] and the bead [65] on a side of the first end of the drive roller [36], and a third clearance between a second end of the drive roller [36] and the bead [65] [In the invention of Kurokawa et al., there is negligible clearance between the bead on a particular end and the respective end of the rollers, thus the sum of all three measures is also negligible and less than the clearance between the first end of the driven roller and the driven roller support means].

16. Regarding claim 17, Kurokawa et al. disclose the image forming apparatus as claimed in claim 15, wherein the bead [65] is provided on an inner side of the

conveyance belt [35], and a groove is formed on a circumferential surface of the drive roller so that the bead is brought into engagement with the groove [See Fig. 1A].

17. Regarding claim 28, Kurokawa et al. disclose the image forming apparatus of claim 15, further comprising pressing means [12] for pressing the conveyance belt to the drive roller [36], wherein the pressing means [12] is located at a position opposite to the drive roller [36] with the conveyance belt [35] interposed therebetween [col. 2, lines 49-53].

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

20. Claims 4, 5, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa et al. (US 5873016) in view of Ohata et al. (JP2002193471).

21. Regarding claim 4, Kurokawa et al. disclose the belt conveyance apparatus as claimed in claim 1.
22. Regarding claim 5, Kurokawa et al. disclose the belt conveyance apparatus as claimed in claim 4, wherein a taper is formed on an end surface of the drive roller [36] so that, in an unoperated state, a non-tapered portion of the end surface overlaps a side surface of the bead [65] [See fig. 1B].
23. Regarding claim 18, Kurokawa et al. disclose the image forming apparatus of claim 15.
24. Regarding claim 19, Kurokawa et al. disclose the image forming apparatus of claim 18, wherein a taper is formed on an end surface of the drive roller [36] so that, in an unoperated state, a non-tapered portion of the end surface overlaps a side surface of the bead [65] [See fig. 1B].
25. Kurokawa et al. differ from the instant invention by not disclosing "wherein coefficient of friction between an end portion of the drive roller and the bead is set smaller than a coefficient of friction of a center portion of the drive roller and the bead", as set forth in claims 4 and 18.
26. Ohata et al. teach a belt conveyance apparatus, wherein the coefficient of friction between an end portion of a drive roller and a bead is set smaller than a coefficient of friction of a center portion of drive roller and the bead [see Figs. 7a and 7b, see also machine translation, par. 0036].
27. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have including the teachings of Ohata et al. in the apparatus of

Kurokawa et al. in order to keep frictional shearing stress low [Ohata et al., machine translation, par. 0036, lines 2-3].

28. Claims 6 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa et al. (US 5873016) in view of Ohata et al. (JP2002193471) further in view of Kawaishi et al. (JP05306037).

29. Regarding claim 6, Kurokawa et al. and Ohata et al. teach the belt conveyance apparatus as claimed in claim 5.

30. Regarding claim 20, Kurokawa et al. and Ohata et al. teach the image forming apparatus as claimed in claim 19.

31. Kurokawa et al. differ from the instant invention by not disclosing wherein an outer diameter of a second rotational member is within a range of 1.0 mm of an outer diameter of a first rotational member, as set forth in claims 6 and 19.

32. Kawaishi et al. teach a belt conveyance apparatus, comprising a first rotational member constituting the center portion of the drive roller and a second rotational member constituting the end portion of the drive roller [See Fig. 3], wherein an outer diameter of the second rotational member is within a range of 1.0 mm of an outer diameter of the first rotational member [Machine Translation, par. 0048, lines 14-18].

33. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included to optimal range of Kawaishi et al. in the apparatus of Kurokawa et al. in order to prevent weakening of contact pressure [Kawaishi et al., Machine Translation, par. 0048, lines 14-17].

34. Claims 7 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa et al. (US 5873016) in view of Ohata et al. (JP2002193471) further in view of Maki (JP04169440).

35. Regarding claim 7, Kurokawa et al. and Ohata et al. teach the belt conveyance apparatus as claimed in claim 5.

36. Regarding claim 21, Kurokawa et al. and Ohata et al. teach the belt conveyance apparatus as claimed in claim 19.

37. Kurokawa et al. differ from the instant invention by not disclosing wherein a "taper angle of the taper with respect to the end surface of the drive roller is set in a range from 10 degrees to 45 degrees", as set forth in claims 7 and 21.

38. Maki et al. teach a belt conveyance apparatus wherein a taper angle of a taper with respect to the end surface of a roller is set in a range from 10 degrees to 45 degrees [See Figs. 1 and 3a].

39. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the taper angle of Maki et al. in the apparatus of Kurokawa et al. in order to prevent the bead from being easily displaced from the belt [Maki, English Abstract, lines 18-19].

40. Claims 8-10, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa et al. (US 5873016) in view of Hayakawa et al. (JP2002060085).

41. Regarding claim 8, Kurokawa et al. disclose the belt conveyance apparatus as claimed in claim 1, wherein an axis of the drive roller and an axis of the driven roller are substantially perpendicular to a direction of conveyance of a paper sheet.
42. Regarding claim 9, Kurokawa et al. disclose the belt conveyance apparatus as claimed in claim 8, wherein the bead is formed on one side of an inner surface of the conveyance belt so that, in an operated stated, the bead interferes with a lower one of opposite ends of the driven roller in operation [As seen in Fig. 1A, the bead 65 is formed on both sides, thus satisfying the limitation of being formed on one side].
43. Regarding claim 10, Kurokawa et al. disclose the belt conveyance apparatus as claimed in claim 9, wherein a taper is formed on an end surface of the drive roller [36] so that, in an unoperated state, a non-tapered portion of the end surface overlaps a side surface of the bead [65'] [See fig. 1B].
44. Regarding claim 22, Kurokawa et al. disclose the image forming apparatus as claimed in claim 15, wherein an axis of the drive roller and an axis of the driven roller are substantially perpendicular to a direction of conveyance of a paper sheet.
45. Regarding claim 23, Kurokawa et al. disclose the image forming apparatus as claimed in claim 22, wherein the bead is formed on one side of an inner surface of the conveyance belt so that, in an operated stated, the bead interferes with a lower one of opposite ends of the driven roller in operation [As seen in Fig. 1A, the bead 65 is formed on both sides, thus satisfying the limitation of being formed on one side].
46. Regarding claim 24, Kurokawa et al. disclose image forming apparatus as claimed in claim 23, wherein a taper is formed on an end surface of the drive roller [36]

so that, in an unoperated state, a non-tapered portion of the end surface overlaps a side surface of the bead [65'] [See fig. 1B].

47. Kurokawa et al. differ from the instant invention by not disclosing that the axis of the driven roller is inclined with respect to the axis of the drive roller, as set forth in claims 8 and 22.

48. Hayakawa et al. teach the axis of a driven roller [61] that is inclined with respect to the axis of a drive roller [62] [Figs. 3, 4a and 4b] [English Abstract, lines 8-19].

49. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the teachings of Hayakawa et al. in the apparatus of Kurokawa et al. in order to eliminate looseness and wrinkles on the transfer surface [Hayakawa et al., English Abstract, lines 26-28].

50. Claims 11 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa et al. (US5873016) in view of Hayakawa et al. (JP2002060085) further in view of Maki (JP04169440).

51. Regarding claim 11, Kurokawa et al. disclose the belt conveyance apparatus as claimed in claim 10.

52. Regarding claim 25, Kurokawa et al. disclose the image forming apparatus as claimed in claim 24.

53. Kurokawa et al. differ from the instant invention by not disclosing wherein a "taper angle of the taper with respect to the end surface of the drive roller is set in a range from 10 degrees to 45 degrees", as set forth in claims 11 and 25.

54. Maki et al. teach a belt conveyance apparatus wherein a taper angle of a taper with respect to the end surface of a roller is set in a range from 10 degrees to 45 degrees [See Figs. 1 and 3a].

55. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the taper angle of Maki et al. in the apparatus of Kurokawa et al. in order to prevent the bead from being easily displaced from the belt [Maki, English Abstract, lines 18-19].

56. Claims 13 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa et al. (US5873016) in view of Omata et al. (US2002/0110392).

57. Regarding claim 13, Kurokawa et al. disclose the belt conveyance apparatus of claim 1.

58. Regarding claim 27, Kurokawa et al. disclose the image forming apparatus of claim 15.

59. Kurokawa et al. differ from the instant invention by not disclosing "wherein a coefficient of friction between the drive roller and the conveyance belt is greater than a coefficient of friction between the driven roller and the conveyance belt", as set forth in claims 13 and 27.

60. Omata et al. teach a belt conveyance apparatus wherein a coefficient of friction between a drive roller and a conveyance belt is greater than a coefficient of friction between a driven roller and the conveyance belt [par. 0014; "the surface of the driven roller has a layer whose coefficient of friction is lower than that of the surface of the driving roller"].

61. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the teachings of Omata et al. in the apparatus of Kurokawa et al. in order to "prevent generation of a local convex portion as a result of adhesion to foreign matter, such as scattered toner, to the rollers between which the transferring material carrying belt or the intermediate transferring belt is wound and stretched, thereby preventing staining of the rear surface of the transfer material due to cleaning defect of the belt, transfer defect, etc." [Omata et al. par. 0013].

Allowable Subject Matter

62. Claims 12 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

63. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not disclose or suggest the claimed, "wherein a frictional force in the thrust direction between the driven roller support means and the driven roller is smaller than a frictional force of the driven roller and the conveyance belt", in combination with the remaining claim elements, as set forth in claims 12 and 26.

64.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan D. Walsh whose telephone number is (571)272-2726. The examiner can normally be reached on Monday through Friday, from 9:00 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Gray can be reached on (571) 272-2119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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